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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,516	02/05/2004	Frederick M. Mako	MAKO-12 CONT	6541
7590 Ansel M. Schwartz Suite 304 201 N. Craig Street Pittsburgh, PA 15213				
			EXAMINER ORLANDO, MICHAEL N	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 12/19/2011	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/773,516

Applicant(s)

MAKO ET AL.

Examiner

MICHAEL ORLANDO

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 9-11 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 9-11 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/27/2011
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

The arguments and amendments submitted 03/09/2010 have been fully considered, but the merits of the claims remain unpatentable over the prior art as set forth below.

Claim Rejections - 35 USC § 112

1. Claims 9-11 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The examiner finds no support for maintaining a bond thickness of less than 0.010 inches. The specification merely seems to support the initial machined gap of the sleeves and tubes not the maintained bond thickness.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimpo (JP 06-256067) in view of Litton (US 2,972,808) and optionally further in view of either Shinoda et al. (US 4,810,836).

Regarding claim 9, Shimpo discloses a method of joining ceramic products comprising: providing a slurry of polysilazane compound, polycarbosilane compound and ceramic powder of the same type as the products to be joined; applying the slurry to the end faces of two ceramic products to be joined; gluing the end faces together; and heating at a temperature of 1200.degrees.C. to maximize bind strength. Shimpo

discloses that the method can be used to form integrated ceramics of complex shapes and large objects through firmly fixed joints and in the Examples sets forth that the type of ceramic productions to be joined can be sticks having a diameter (thus cylindrical bodies) (translation pages 1-12). Also note that Shimpo discloses adding other additives such as surfactants or thickeners (page 7), which read on the term fillers. Shimpo additionally discloses that the production of the bonding material is done in an inert (i.e. non-reactive) atmosphere (page 8) and appreciates that the joining material should be free from any outside contaminants (pages 3 and 4).

Shimpo fails to explicitly teach the claimed bond geometry, the inert atmosphere and the bond thickness.

As to the preparation of the slurry in an inert atmosphere, such is an obvious extension of Shimpo because Shimpo discloses both that conversion should be done in an inert atmosphere and that contaminants in general should be avoided in the production process (page 3 and page 8). The inert atmosphere therefore would have been provided to ensure no contaminants are present that would otherwise produce undesired side reactions.

As to the bond thickness it would have been within the level of ordinary skill to balance the desired level of adhesion and cost when choosing a bond thickness. "[W]here the general conditions of a claim are disclosed in the prior art (adhesive bonding ceramics via preceramic slurries), it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

As to the tapering, Litton, drawn to also to a method of joining cylindrical bodies and more specifically a method in which one of the bodies is ceramic, discloses that the ends of the cylindrical bodies can be tapered to create a male and female end (figure 1) that forms a large bonding interface and subsequent high bond strength that is not limited in bond interface size by the cross sectional diameter of the bodies (column 1, line 55 - column 2, line 14). It therefore would have been obvious to have tapered the ends of the Shimpo's ceramic bodies in order to increase the bond interface length and create a stronger bond that is no longer limited by the cross sectional diameter of the bodies themselves.

As to the taper angle discrepancy, it is noted that Shimpo discloses that matching of the angles creates a tight seal (columns 3 and 4) and therefore it is clear that not matching the angles exactly would create a less tight seal with more of a gap between the bodies. It is therefore would have been obvious to slightly un-match the tapering angles to create more of a gap for filling with adhesive (i.e. controlling bondline thickness). This fact is also emphasized in Shinoda (figure 12) whereby it is indicated that matching of the geometry of two tapered bodies creates a tight seal that minimizes the thickness of an adhesive applied there between (columns 10 and 11). It was therefore known to modify the fit of the tapered bodies in order to control the tightness of the fit and the resulting bondline thickness. As to the female angle being larger than male angle such is obvious because there is only a finite number of predictable solutions for un-matching the angles (i.e. male bigger or female bigger) so it would have been obvious to try each.

Regarding claim 10, Shimpo discloses bonding silicon carbide productions by providing the slurry silicon carbide powder of mean particle diameter of 2 microns (page 8), which clearly falls within the claimed range. The courts have established that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

Regarding claim 11, Shimpo discloses that the particle size an average particle size (page 8). The use of the term average indicates that there is more than one particle size. The use of more than one different particle size (i.e. an average) reads on the limitation of at least two distinct particle sizes.

Response to Arguments

Applicant's arguments filed 10/27/2011 have been fully considered but they are not persuasive.

The applicant argues that it would not have been obvious to have modified the taper angle based on Litton's joining foil and based on the surprising fact that such a mismatch leads to a fillable gap.

The examiner disagrees and notes the rejection is based upon a combination whereby Litton is not relied upon for the joining foil. Shimpo generally discloses the invention including the type of adhesive material utilized. The primary difference therefore lies in the tapering of the edges and in the mismatching of the taper angles. Litton is relied upon simply to show that tapering edges creates a larger bond interface

and as such it would have been obvious to have tapered the edges of Shimpo to create a larger bond interface that is no longer restricted to the cross sectional diameter of the cylinders (i.e. butt joint). Both Shinoda and Shimpo, as supplied above, provide teachings that the angle matching of the ends can be utilized to control the tightness of the seal (i.e. the gap). Based on the abovementioned it would have been obvious and predictable to control the angle matching to control the adhesive thickness in said mismatched regions. This is specifically implied by the prior art, but is also noted to be common sense (an imperfect fit will result in a gap). This feature is well known and is commonly utilized in other fields such as construction whereby pieces of wood or drywall are tapered to produce a seam whereby the level of taper is controlled to regulate the size and mating tightness of said seam. The examiner further notes that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The applicant argues the claimed bondline thickness and claims that such would not have been obvious as it would not have been obvious that such would have resulted in appreciably stronger joints.

The examiner disagrees and notes first that as stated above the claimed bondline thickness does not even appear to have support. The claims claim a maintained joint thickness while the specification supports the machined size differences between the cylinders and the sleeve. There is nothing in the specification

that requires that the bondline thickness be less than 0.01 inches at the time the adhesive is supplied and further nothing stating that this thickness will be maintained. In addition, the applicant is arguing that the claimed bondline thickness is unexpectedly better. The prior art does not disclose a bondline thickness, but this does not mean it is patentable to merely state any bondline thickness. As set forth above merely doing a couple pointed trials to determine a suitable or optimal thickness would not be a patentable difference from the prior art of record as the courts have held that "[W]here the general conditions of a claim are disclosed in the prior art (adhesive bonding ceramics via preceramic slurries), it is not inventive to discover the optimum or workable ranges (amount/thickness) by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore the examiner notes that allegations cannot take the place of factual evidence and in this case there has not been a showing of unexpected results commensurate with the broad scope of the claims (any angles, any preceramic, any filler, etc.) that substantiates the applicant's allegations of unexpected results.

The applicant further argues the combination of Litton and Shimpo.

The applicant disagrees with the applicant's assertions and notes that Shimpo generally discloses the cylindrical bodies being joined and the preceramic polymer being utilized to join them. Litton is merely relied upon to provide support for altering the bond geometry of Shimpo's system to create a larger bond interface. In essence the examiner has taken the position that known to bond cylindrical bodies with a preceramic polymer as in Shimpo and obvious to have tapered those edges as in Litton to create a

bond interface of Shimpco that is larger (i.e. more contact area for bonding). Any other features of Litton such as the type of bonding material and other features associated with the taper are beyond the scope of how the reference is relied upon. As noted above one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The applicant further argues the patentability of the bondline thickness and reiterates the previous arguments that smaller bondline thicknesses produce a stronger bond.

The applicant has not provided a showing that is commensurate with the scope of the claims that substantiates this assertion. The examiner further notes that while this may or may not be true at some small thicknesses below 0.01 inches, it is almost certainly not true of thicknesses on a monomolecular level which would be still be a thickness to which the applicant is alleging has unexpected strongly adhesion (monomolecular is below 0.01 inches). Furthermore the examiner notes that the applicant is essentially alleging in this case that they have determined the optimal bond thickness, but determining an optimal amount of an additive (i.e. adhesive) has been held by the courts to be an obvious matter (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL N. ORLANDO whose telephone number is (571)270-5038. The examiner can normally be reached on Monday-Thursday, 7:30am-4:30pm, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip C. Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Michael N Orlando/

Examiner, Art Unit 1745

